

DOINGWHATWORKS



Presentation

FULL DETAILS AND TRANSCRIPT

Subtracting a Fraction From a Whole

KIPP DC: Key Academy, Washington, D.C. • July 2008

Topic: National Math Panel: Critical Foundations for Algebra
Practice: Mathematics Preparation for Algebra

Highlights

- Building a conceptual and practical understanding of fractions
- Group practice splitting whole into fractional parts
- Deriving the algorithm: changing “the one whole you want to subtract from into a fraction by matching the denominator of the fraction that you want to subtract”
- Reinforcing understanding of parts that make up a whole
- Making a list of steps for subtracting a fraction from a whole
- Exit ticket problem to show mastery
- Math journal homework

About the Site

KIPP DC: Key Academy

Washington, D.C.

Demographics

98% Black

1% Hispanic

6% Special Education

Students enter the Key Academy in the fifth grade with a wide range of skills, typically at about a third grade level, where they receive intense instruction to ensure they can meet grade level benchmarks.

Features of the KIPP approach:

- Teaching students to approach problems in as many different ways as possible,
- Using estimation as a way to judge the reasonableness of answers,
- Use of visual representations and manipulatives, and
- Practice strategies of having students find and explain the mistake in “incorrect” problems; develop correct and incorrect problems; write about common mistakes

Full Transcript

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Welcome to Subtracting a Fraction From a Whole.

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My name is Meghan Little. I am a fifth grade math teacher at KIPP DC: KEY Academy, which is a public charter middle school in Southeast DC.

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It’s essential that students really understand where fractions fit in our number system. And in the younger grades when students learn to count, they learn to count just with whole numbers. But then in fourth grade, and then even more so in fifth grade, they discover that there is more out there than just one, two, three, four and five. In fifth grade, we really focus on building a conceptual understanding and a practical understanding of fractions, and so we practice them in all their forms. We practice them as a shaded part of a whole, as part of the group, as a location on a number line, and as a division of whole numbers.

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The other thing that’s really important for the students is just to have sort of a benchmark of what

each fraction's size is, so where it is on the number line. And then also if we are going to use a model, a benchmark in their mind of what that model of one-half looks like, or what the model of one-fourth looks like to be able to compare in their minds, and to be able to generate equivalent fractions. By sixth grade, students are expected to work flexibly with fractions—to be able to interchange them with decimals and percents, and use them in order to solve problems. And so, in fifth grade, it's really essential that they get a genuine conceptual understanding of what each fraction represents, so that they are then able to interchange them with decimals, with percents, and to really use them as a problem-solving tool.

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The goal for this lesson was for students to be able to subtract a fraction from a whole, and to be able to explain that when they have one whole, they actually need to convert it into a fraction before they can subtract a fraction.

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In order to succeed in this lesson, they need to have the prior knowledge that I can take four-fourths or five-fifths, and write it as a whole, and that's something that we've worked on previously, so they already know that when we see three-thirds, it's one whole. For this lesson, I started out by giving them—in groups—just a paper plate, and we said, "Okay, what if Ms. Little wanted one-fourth of your plate? Could you give it to me?" And in teams, I gave them five minutes and I just asked them to discuss and make a plan of how they could give me one-fourth. Before we introduced the math part of it using numbers to represent what we were doing, they did the math part using manipulatives and so they had a whole, they split it in four-fourths and then they gave me one-fourth.

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We reflected on that, and said, "Okay, well, what math problem did we just do?" And they all said, "Well, we did 1 minus one-fourth." And I said, "Well, if you have one, could you really take one-fourth away?" and it was nice to have the visual because I can show them the plate, and I try and take away a fourth and I can. And they said, "Oh, well, actually, you have to change the one into four-fourths." And so, then they sort of derived the algorithm for what we have to do, and we can write it on the board and cross out one, and instead we are going to write four-fourths. At the end of the experimenting part, we came up with a rule, "Well, how do we do this?" And we were able to say, "You need to change the one into a fraction whose denominator matches the fraction that you want to subtract, and then you need to make the one with that denominator equaled to one whole."

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Everyday we have what is our daily aim, and I have them brainstorm what our aim is for the day before we write it down. So they were able to say, “Oh, Ms. Little, what are doing today is we are subtracting fractions from one.” And so, once they were able to come out with that, then I passed out a fill-in-the-blank note sheet. And on that note sheet, before we started subtracting, we just reinforced by shading in pictures, all the different fractions that one equals. So, we said four-fourths, five-fifths, three-thirds. Then, we did a few examples using pictures on the paper so, like, one minus one-tenth.

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We made a list of steps so they reflected on what had they done. Well, we decided step one was change the one to a fraction equivalent to one, and then sort of the bullet point under that, we decided was that the denominator has to match the denominator of the fraction you are subtracting, and then step two was just subtract. And so then, on the back, we practiced doing it—we did about five examples together as a class, but this time not with pictures, just with taking the one and changing it to a fraction equal to one.

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Everyday in class, they do an exit ticket, which I call a show-off. It’s their chance to show-off what they learned, and if they have mastered the material. You might check that it’s four or five questions everyday. For the three or four kids in each class who didn’t master it, then, I know that the next day during our warm-up activity when we are reviewing it, those are the kids who I am going to go stand by, who I am going to make sure I’m right next to them when they do problem number two because that’s the question they always have trouble with.

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I think the next step for me is going to be giving them a math journal, where I give them a problem that’s done incorrectly: a one minus two-ninths that was solved incorrectly, and ask them to solve it and then to explain why did they get it right, and why was the one that I gave them incorrect. And if they can do that, then that shows me that they are really able to analyze the problem, they are able to find a mistake and explain why it’s wrong, and that tells me that they definitely have the understanding that they are ready to move on to the next concept that builds on this skill.

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To learn more about teaching fractions, please explore the additional resources on the Doing What Works website.